

Application No.: 10/643,862

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Amendments to the Claims

1. (Currently Amended) A method of mixing predetermined fixed volumes of two or more liquids in microfluidic devices comprising:

(a) dispensing through capillary passageways at least a first predetermined fixed liquid volume from a first liquid well in a microfluidic device, said first well containing said first predetermined fixed liquid volume and a second predetermined fixed liquid volume from a second liquid well in said microfluidic device, said second well containing said second predetermined fixed liquid volume into a first chamber to form a combined liquid volume, said first chamber having a volume larger than said combined liquid volume;

(b) discharging said combined liquid volume of (a) from said first chamber into a second chamber via one capillary passageway or via two or more separated capillary passageways, to complete mixing of said combined liquid volume, said second chamber having a volume larger than said combined volume.

2. (Previously Presented) A method of mixing liquids of Claim 1 wherein said combined liquid volume of (a) is discharged into said second chamber through two or more separated capillary passageways.

3. (Previously Presented) A method of mixing liquids of Claim 2 wherein said combined liquid volume of (a) is discharged into said second chamber through at least three separated capillary passageways.

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4. (Previously Presented) A method of mixing liquids of Claim 1 wherein said combined liquid volume of (a) discharged into said second chamber is discharged into at least a third chamber through one capillary passageway or via two or more separated capillary passageways.
5. (Previously Presented) A method of Claim 1 wherein said combined liquid volume of (a) is discharged into said second chamber in the form of droplets.
6. (Previously Presented) A method of Claim 1 wherein said first chamber has a volume of at least about twice that of the combined liquid volume of (a).
7. (Previously Presented) A method of Claim 1 wherein said second chamber has a volume of at least about twice that of the combined liquid volume of (a).
8. (Currently Amended) A method of Claim [[6]] 1 wherein said first chamber has a depth of at least about twice that required to hold the combined liquid volume of (a).
9. (Currently Amended) A method of Claim [[7]] 1 wherein said second chamber has a depth of at least about twice that required to hold the combined liquid volume of (a).
10. (Previously Amended) A method of Claim 1 wherein a space of at least 100  $\mu\text{m}$  is provided above the level of the combined liquid volume of (a) in the first chamber.

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11. (Previously Presented) A method of Claim 1 wherein a space of at least 100  $\mu\text{m}$  is provided above the level of the combined liquid volume of (a) in the second chamber.

12.-15. (Canceled).

16. (Previously Presented) A method of Claim 3 wherein three or more separated capillary passageways are in liquid communication between said first and second chambers.

17. (Original) A method of Claim 1 wherein at least one of said first and second chambers contains steps or ramps to assist mixing of said combined liquids.

18. (Currently Amended) A method of Claim 1 wherein said combined liquid volume of (a) in said at least one capillary passageway is discharged into said second chamber with a velocity of at least 1 mm/sec.

19. (Currently Amended) A method of Claim 1 wherein said first and second liquids are dispensed from said first and second liquid ~~from~~ wells at the same time into said first chamber through capillary passageways.

20. (Previously Presented) A method of Claim 1 further comprising moving said completely mixed combined liquid volume of (a) to downstream chambers for further processing.

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21. (Currently Amended) A microfluidic device in which predetermined fixed volumes of liquids are mixed comprising:

(a) a first chamber for receiving ~~through capillary passageways~~ and combining at least a first predetermined fixed liquid volume from a first liquid well in said microfluidic device and a second predetermined fixed liquid volume from a second liquid well, in said microfluidic device, said first chamber having a volume larger than the combined first and second liquid volumes; said first chamber being in fluid communication with said first and second liquid wells through capillary passageways.

(b) a second chamber for complete mixing of said at least first and second liquid volumes, said second chamber being in liquid communication with said first chamber via one capillary passageway or via two or more separated passageways said second chamber having a volume larger than the combined first and second liquid volumes.

22. (Previously Presented) A microfluidic device of Claim 21 wherein said first and second chambers are in liquid communication through two or more separated capillary passageways.

23. (Previously Presented) A microfluidic device of Claim 22 wherein said first and second chambers are in liquid communication through at least three separated capillary passageways.

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24. (Previously Presented) A microfluidic device of Claim 21 wherein said second chamber is in liquid communication with at least a third chamber through one capillary passageway or two or more separated capillary passageways.

25. (Previously Presented) A microfluidic device of Claim 21 wherein said first chamber has a volume of at least about twice that of the combined volume of said first and second liquid volumes.

26. (Previously Presented) A microfluidic device of Claim 21 wherein said second chamber has a volume of at least about twice that of the combined volume of said first and second liquid volumes.

27. (Currently Amended) A microfluidic device of Claim ~~[[25]]~~ 21 wherein said first chamber has a depth of at least about twice that required to hold the combined volume of said first and second liquid volumes.

28. (Currently Amended) A microfluidic device of Claim ~~[[26]]~~ 21 wherein said second chamber has a depth of at least about twice that required to hold the combined volume of said first and second liquid volumes.

29. (Previously Presented) A microfluidic device of Claim 21 wherein a space of at least 100  $\mu\text{m}$  is above the level of said combined first liquid and second liquid volumes in the first chamber.

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30. (Previously Presented) A microfluidic device of Claim 21 wherein a space of at least 100  $\mu\text{m}$  is above the level of said combined first liquid and second liquid volumes in the second chamber.

31. (Previously Presented) A microfluidic device of Claim 21 wherein said capillary passageways have cross-sectional dimensions of 1 to 2000  $\mu\text{m}$ .

32. (Previously Presented) A microfluidic device of Claim 31 wherein said capillary passageways have cross-sectional dimensions of 200 to 1000  $\mu\text{m}$ .

33. (Previously Presented) A microfluidic device of Claim 21 wherein said capillary passageways have lengths of 0.5 to 100 mm.

34. (Previously Presented) A microfluidic device of Claim 33 wherein said capillary passageways have lengths of 1 to 50 mm.

35. (Previously Presented) A microfluidic device of Claim 21 wherein three or more separated capillary passageways are in liquid communication between said first and second chambers.

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37. (Previously Presented) A microfluidic device of Claim 21 wherein at least one of said first and second chambers contains microstructures to assist mixing or removal of said first and second liquids.

38. (Original) A microfluidic device of Claim 21 wherein said first chamber is in liquid communication through capillary passageways with wells containing said at least first and second liquids.

39. (Original) A microfluidic device of Claim 21 wherein said second chamber contains means for preventing premature movement of said liquids before mixing is complete.

40. (Previously Presented) A microfluidic device of Claim 22 wherein said two or more capillary passageways have different diameters.

41. (Previously Presented) A microfluidic device of Claim 22 wherein said two or more capillary passageways are disposed so as to cause liquid streams or droplets exiting from said passageways to impinge as said liquid streams or droplets enter said second chamber.

42. (Previously Presented) A microfluidic device of Claim 22 wherein said two or more capillary passageways are manifolded before entering said second chamber.

43. (Previously Presented) A microfluidic device of Claim 21 wherein said passageways have hydrophilic surfaces.